

THAT WHICH IS CLAIMED:

1. An apparatus for chemically analyzing a sample fluid, the apparatus comprising:

5 a first fluid selection valve having a plurality of sample input ports and a sample output port, the first fluid selection valve being configured to selectively fluidly connect each of the sample input ports to the sample output port, and each sample input port being configured to receive a sample fluid;

a second fluid selection valve having a plurality of reagent input ports and a  
10 reagent output port, the second fluid selection valve being configured to selectively fluidly connect each of the reagent input ports to the reagent output port, and each reagent input port being configured to receive a reagent fluid;

a fluid injection valve adjustable between first and second positions, the fluid injection valve being configured to receive the sample and reagent fluids from the  
15 sample output port of the first fluid selection valve and the reagent output port of the second fluid selection valves;

a sample vessel fluidly connected to the fluid injection valve and configured to receive the sample fluids therefrom; and

an analysis device fluidly connected to the injection valve via the sample  
20 vessel and configured to receive the sample and reagent fluids from the fluid injection valve, the analysis device configured to determine at least one chemical characteristic of the sample fluid,

wherein the fluid injection valve in the first position fluidly connects the sample output port to the sample vessel such that the sample fluids can be injected  
25 into the sample vessel, and the fluid injection valve in the second position fluidly connecting the reagent output port to the sample vessel such that the reagent fluids can be injected into the sample vessel.

2. An apparatus according to Claim 1 wherein the fluid injection valve in the first  
30 position fluidly connects the sample output port to an exhaust outlet via the sample vessel, and the fluid injection valve in the second position fluidly connects the reagent output port to the analysis device via the sample vessel.

3. An apparatus according to Claim 1 wherein at least one of the first and second fluid selection valves has a rinse fluid input port fluidly connected to a source of rinse fluid.
- 5 4. An apparatus according to Claim 3 wherein the source of rinse fluid is configured to supply water to the first fluid selection valve.
5. An apparatus according to Claim 1 wherein at least one of the first and second fluid selection valves has a port fluidly configured to be connected to the analysis  
10 device via the fluid injection valve to receive a fluid evacuated from the analysis device.
6. An apparatus according to Claim 1 further comprising first and second fluid  
15 pumps configured to be selectively connected by the fluid injection valve to the sample vessel such that the fluid injection valve in the first position fluidly connects the first pump to the sample vessel and the fluid injection valve in the second position fluidly connects the second pump to the sample vessel.
7. An apparatus according to Claim 1 further comprising an optical device  
20 configured to optically analyze a fluid in the analysis device and determine at least one chemical characteristic thereof.
8. An apparatus according to Claim 1 further comprising a processing device and  
25 a display device, the processing device being in communication with the analysis device and configured to process an output of the analysis device and display a chemical characteristic of at least one of the sample fluids on the display device.
9. An apparatus according to Claim 8 wherein the processing device and the  
30 display device are electronically connected to the analysis device via a communication network.
10. An apparatus according to Claim 8 wherein the processing device is configured to communicate the chemical characteristic via an Ethernet port.

11. An apparatus according to Claim 1 further comprising a mixer configured to mix fluids in the analysis device.
- 5 12. An apparatus according to Claim 1 further comprising a bubble detector configured to detect the presence of gas in a fluid passing through the sample vessel.
13. An apparatus according to Claim 1 further comprising a standard sample source fluidly connected to the first fluid selection valve and configured to supply a  
10 standard sample having a predetermined chemical characteristic.
14. A method of chemically analyzing a sample fluid, the method comprising:  
adjusting a first fluid selection valve to fluidly connect a select sample input  
port to a sample output port such that a select sample fluid is delivered from the  
15 sample input port to the sample output port;  
adjusting a fluid injection valve to a first position such that the fluid injection  
valve fluidly connects the sample output port to a sample vessel;  
delivering the select sample fluid from the sample output port to the sample  
vessel;  
20 adjusting the fluid injection valve to a second position such that the fluid  
injection valve fluidly connects a reagent input port to the sample vessel;  
delivering a reagent fluid from the reagent input port to an analysis device via  
the sample vessel such that a predetermined amount of the select sample fluid is  
delivered to the analysis device; and  
25 determining at least one chemical characteristic of the select sample fluid in  
the analysis device.
15. A method according to Claim 14 further comprising adjusting the fluid  
injection valve to the first position and thereby fluidly connecting the analysis device  
30 to an exhaust outlet via the sample vessel such that the select sample fluid is  
exhausted therefrom.

16. A method according to Claim 14 further comprising adjusting the fluid injection valve to the second position and thereby fluidly connecting the sample vessel to a rinse fluid source such that the sample vessel is rinsed with a rinse fluid from the rinse fluid source.
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17. A method according to Claim 14 wherein said first delivering step comprises actuating a first pump and said second delivering step comprises actuating a second pump.
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18. A method according to Claim 14 wherein said determining step comprises detecting an optical characteristic of the select sample fluid in the analysis device.
19. A method according to Claim 14 further comprising delivering an output signal of the analysis device to a processing device and displaying a chemical
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- characteristic of the select sample fluid on a display device.
20. A method according to Claim 14 further comprising communicating a signal representative of a characteristic of the select sample fluid via a communication network.
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21. A method according to Claim 20 wherein said communicating step comprises communicating the signal via an Ethernet port.
22. A method according to Claim 14 further comprising mixing the select sample
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- fluid and reagent in the analysis device.
23. A method according to Claim 14 further comprising detecting the presence of gas in a fluid passing through the sample vessel.
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24. A method according to Claim 14 wherein said first and second adjusting steps comprise fluidly connecting a standard sample source to the sample vessel, the standard sample source providing a standard sample having a predetermined chemical characteristic to the analysis device.

25. A method according to Claim 14 wherein said second delivering step comprises delivering a predetermined amount of a fill reagent fluid to the analysis device and subsequently delivering a titration reagent fluid to the analysis device to  
5 perform a titration of the select sample fluid.

26. A method according to Claim 14 further comprising repeating said second delivering step and said determining step to separately analyze first and second predetermined amounts of the select sample fluid, the chemical characteristic of the  
10 first and second predetermined amounts being substantially the same.

27. A method according to Claim 26 further comprising calibrating the analysis device according to the chemical characteristic determined for the first and second predetermined amounts of the select sample fluid and a predetermined characteristic  
15 of the select sample fluid.